NuTest help contents.

The NuTest application is designed to help you prepare for all classes of amateur radio licenses. It presents you with on-screen tests using questions and answers taken from the FCC (Federal Communications Commission) question pools. Printed practice examinations can also be generated. These have a format very similar to the FCC examinations administered by the VEC (Volunteer Examiner Coordinator) system.

Alphabetic list of topics.

Overview of NuTest features

The formula button

The calculator button

US Amateur bands

Register NuTest

Help on the notebook pages:

About NuTest

Tests

Options

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Print

Support

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Support
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Time constant
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Overview of NuTest features.

- Generates on screen tests using the FCC question pools.
- Provides interactive feed-back and automatic test scoring.
- Generates printed tests in a style similar to the real thing.
- Allows tests to be customized to your own needs.
- Allows you to "Browse" through the FCC question pools.
- Displays an "Explanation" Help topics each question in the pools.
- Displays the entire text of Part 97 of the FCC rules with interactive jumps.
- Allows you to maintains a log of the results from your test drill sessions.
- Allows you to review previous test drill sessions and graph your results.

About NuTest.

The NuTest About screen is where registration reminders ("Nag Screens") will be displayed for those people who might forget to register. If you are a registered user, then enjoy the view!

There are several buttons at the bottom of the NuTest window that appear on every page. The Exit and Help buttons are self explanatory. The Formula Button brings up a help topic giving some useful formulae for the selected license class. The Calculator Button gives you instant access to the Windows Calculator.

Thank you….

Donald B. Bell (KI5YT) for your support and encouragement throughout the development of NuTest.

Victor M. Paul (WB0TEV) for the shots of your fine antenna tower.

David Price (KE4ZQZ) and the rest for your useful comments.

Tests.

This is the main testing page. The top window contains a question from the appropriate FCC question pool and three options are presented in the other text windows. To select an option use any one of the following methods:

- Click on one of the answers.
- Press keys 'A' - 'C'
- Click on one of the options buttons.

Your current score and how well you answered the currently displayed question is shown in the white area at the bottom of the NuTest window.

There is a set of VCR style Navigation Buttons to allow movement backwards and forwards through the test. You can move to the start or end, or section by section.

Click on the Review Button to get feedback on questions you have already answered in the current test session.

The Explain Button brings up a help topic with some comments relevant to the correct answer for the currently displayed question. If the explanation has a reference to the FCC Part 97 regulations then click on this reference and the relevant Part 97 rule will be displayed.

The Generate Test button starts a new test if NuTest is in testing mode.

NuTest options page.

The options page is the 'control center' for NuTest. Here is the purpose of each option:

The Exam Class options select which question pool will be used to generate the next test. Some of the buttons may be grayed out if you are using an unregistered version.

The Question class options:

If Random Question Sequence is checked then the questions in the test will be presented in any order. If it is unchecked then the questions will be presented in the exact sequence as published in the FCC question pools.

Random Answer Sequence controls the sequence in which the options are displayed. If this box is checked then each set of options will be displayed in a random sequence. If it is unchecked then the options will be presented in the exact sequence as published in the FCC question pools.

The Move To Next Question box controls what happens when you select an option during a test. If it is checked then the next question is displayed when an option is selected, otherwise you must move to the next question manually.

By default, when you select an answer, you will be told if your choice was correct or not. If you would rather wait until the end of the test then leave the 'Give feedback' box unchecked.

The 'Show Score When' options.

You have the choice of a continuous display of your score during a test, or you may choose to see your score at the end of the test.

The 'Show Correct Option' options.

The correct option can be highlighted if you wish. This can be done During Question Display (OK, it is not really a test if you do this but it can be useful.) or momentarily After Question Display.

The 'Use Sound Effects' option allows encouraging sounds to play when you select a correct option.

The Show Hints option enables/disables the hint system for the entire program. Hints are those little yellow labels that pop up when the cursor remains over a control for more than a second or two.

The 'mode' options control how a test is generated. In Generate Tests mode a test resembling the FCC test in content and number of questions is generated. In Browse Question Pool mode **all** of the questions in the selected FCC question pool are displayed sequentially.

The 'Location of Calculator' button allows you to specify a path to the Windows Calculator. The default usually works fine. If you have moved or renamed the Calculator program, this button will aid you in defining the path.

The 'Number of Questions in each Section Topic' list displays the questions and topics that would be selected in a real FCC test. You can change these numbers if you wish to customize the tests that

NuTest generates by clicking and then editing in the 'number' column. For example, in the Novice test one question is selected from each topic. The Default Numbers button sets the section contents back to the FCC defaults.

Results log.

On this page you can log and graph your progress in each exam class. Entries in the progress log are automatically saved to a log file. You may add a test result, remove a test result or clear the entire log by clicking on the buttons. The minimum passing grade for all levels is 75%.

Printing and previewing tests.

The print page allows printing of FCC style tests. The buttons on this page allow selection of a logo for the cover page of the test booklet as well as a file containing text to be printed there. The answer sheet template file contains text intended to be read by the student as well as a form for student details and will appear above an answer grid. The Logo, Facing Sheet Text and Answer Sheet Text can all be customized to your own requirements by editing or replacing the files shown on this page. For example, you can easily modify NuTest to print the name and logo of your local Ham Radio Club!

The Use Serial Number feature allows printed tests to be reproducible. Normally, printed tests are generated using randomly selected questions from the FCC pool files. If the serial number feature is used, then previously printed tests can be duplicated by entering the serial number that appears on the printed test. The serial number of a test is always printed at the top of each page.

The Print button does just that. It starts the printing of a test.

The New Test button allows new tests to be generated for printing without leaving the print page.

Diagrams can be printed on the question sheets alongside the relevant questions or all together on a separate sheet. If they are printed on a separate sheet then only the diagrams needed for the current test are printed.

The Print Preview button allows a printed test to be examined on screen before committing it to hard copy. If this button is grayed out it is because a test is not currently available. Press the New Test button to generate one. During Print Preview there are several controls available:

A set of VCR style controls for moving around the printed test. And a set of Zoom controls. You may also zoom in and out using the left and right mouse buttons. You can select single page layout or double page layout.

Useful Formulae.

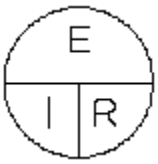
- Element 2 — Novice Class
- Element 3A — Technician Class
- Element 3B — General Class
- Element 4A — Advanced Class
- Element 4B — Extra Class

The pop-up calculator.

Please consult your Windows documentation for details of the calculator. Be aware that early versions of the Windows calculator can give incorrect results.

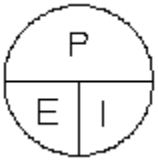
Useful Formulae, Novice Class

Ohms Law:



To use the Ohms Law circle cover up the unknown quantity. The visible part of the circle then shows the equation to use. Click on the letters in the circle for more information.

Power:



Use the power circle in the same way as the Ohms Law circle.

Frequency and wavelength:

Using meters.

$$f(MHz) = \frac{300}{Wavelength(Meters)} \qquad Wavelength(Meters) = \frac{300}{f(MHz)}$$

Using feet.

$$f(MHz) = \frac{936}{Wavelength(Feet)} \qquad Wavelelength(feet) = \frac{936}{f(MHz)}$$

See Also:

- Element 3A — Technician Class
- Element 3B — General Class
- Element 4A — Advanced Class
- Element 4B — Extra Class

Useful Formulae, Technician Class.

Resistance calculations.

Capacitance Calculations.

Inductance Calculations

Resistor color code

See Also:

Element 2 Novice Class

Element 3B General Class

Element 4A Advanced Class

Element 4B Extra Class

Useful Formulae, General Class

Peak envelope power.

Decibel calculations.

Impedance and reactance.

Transformers.

RMS voltage.

Antenna calculations.

Characteristic impedance and standing wave ratio calculations.

See Also:

Element 2 Novice Class

Element 3A Technician Class

Element 4A Advanced Class

Element 4B Extra Class

Useful Formulae, Advanced Class

Resonance

Half power bandwidth.

Q factor for a Parallel resonant circuit.

Q factor for a Series resonant circuit.

Phase angle in a RLC circuit.

Power factor.

Amplifier efficiency.

Velocity factor.

Frequency modulation and deviation.

See Also:

Element 2 Novice Class

Element 3A Technician Class

Element 3B General Class

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Useful Formulae, Extra Class

Time constant

Impedance of a series RC circuit.

Impedance of a parallel RC circuit.

Polar and rectangular notation

Gain of an op-amp.

Noise power.

Bandwidth and baud rates.

Gain and beamwidth for parabolic antenna

See Also:

Element 2 Novice Class

Element 3A Technician Class

Element 3B General Class

Element 4A Advanced Class

Ohms Law for voltage.

$$E = IR$$

The voltage "E" across a circuit is equal to the resistance R (Ohms) multiplied by I the current flowing (Amps.).

Ohms Law for current.

$$I = \frac{E}{R}$$

The current *I* (Amps) flowing in a circuit is equal to the voltage E (Volts) across the circuit divided by *R* the resistance of the circuit (Ohms).

Ohms Law for resistance.

$$R = \frac{E}{I}$$

The resistance *R* (Ohms) of a circuit is equal to the voltage E (Volts) across the circuit divided by *I* the current flowing in the circuit (Amps.).

Power.

$$P = EI$$

Power, the rate of doing work, is measured in watts. It is equal to the current "I" multiplied by the voltage "E".

Power and voltage.

$$E = \frac{P}{I}$$

Example: A resistor dissipating 10 watts of heat and passing a current of 1 Amp must have a voltage of 10 Volts across it.

Power and current.

$$I = \frac{P}{E}$$

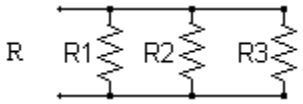
Example: A power transistor consuming 20 watts at a collector voltage of 10 volts must have a collector current of 2 Amps.

Resistance calculations.

Resistors in series:

R = R1 + R2 + R3

Resistors in parallel:



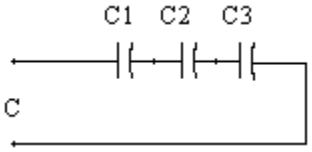
1/R = 1/R1 + 1/R2 + 1/R3

For the special case of 2 resistors in parallel: **R = (R1 x R2) / (R1 + R2)**

Capacitance calculations

The basic unit of capacitance is the Farad. In electronics, capacitance is usually given in microfarads (millionths of Farads) or picofarads (millionths of microfarads). A capacitor consists of two or more conductors (often called the plates) separated by an insulator (the dielectric).

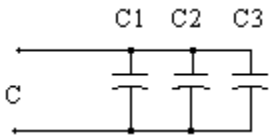
Capacitors in series:



1/C = 1/C1 + 1/C2 + 1/C3

For the special case of two capacitors in series: **C = (C1 x C2) / (C1 + C2)**

Capacitors in parallel:



C = C1 + C2 + C3

Formula for calculating capacitance from physical characteristics:

$$C = 0.224 \frac{KA}{d}(n-1)$$

Where:
C is capacitance in picofarads.
K is a value that depends on the insulator between the plates. (The dielectric constant.)
A is the area of one side of a plate, in square inches.
d is the plate separation, in inches.
n is the number of plates.

Inductance calculations.

The basic unit of inductance is the henry. In electronics, we use millihenrys (thousandths of a henry) or microhenrys (millionths of a henry).

To calculate inductance, use the same formula as in resistance calculations. Substitute millihenrys or microhenrys for ohms.

Physically an inductor is a coil of wire. The coil may be a single turn or part of a turn or it may have thousands of turns. The interior (core) may be air or it may contain iron or iron compounds.

Approximate formula for calculating inductance from physical characteristics:

$$L(\mu H) = \frac{a^2 n^2}{9a + 10b}$$

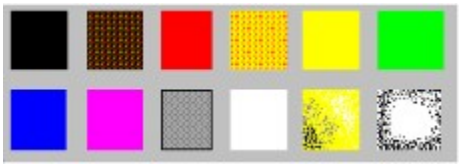
Where:
L is inductance in microhenrys.
a is coil radius in inches.
b is coil length in inches
n is number of turns.

This formula assumes one layer and a core of air. Adding a ferrous core increases the inductance.

The resistor color code.

Colors used:

0 1 2 3 4 5



6 7 8 9 5% 10%

The resistor below has a nominal value of 4,700 ohms. The stated tolerance of 10% means that the actual value could lie between 4,230 and 5,170 ohms.

Second value digit Tolerance

First value digit. Multiplier.

First value digit.

In the example shown, the yellow band signifies a "4" as the first digit in the resistor value.

Second value digit.

In the example shown, the violet band signifies a "7" as the second digit in the resistor value.

Value multiplier.

In this example, the red multiplier band means that the value digits have to be followed by two zeros, in other words multiplied by 100.

Tolerance band.

If no tolerance band is present, the stated value of the resistor is subject to a manufacturing tolerance of 20%. In this example the tolerance band is silver. This indicates a tolerance of 10%. The tolerance for this resistor is tighter than the 20% standard resistor. Therefore, it is usually more expensive.

Output peak envelope power.

Output PEP (Peak Envelope Power) of a linear amplifier (watts):

$$PEP = \frac{(PEV \times 0.707)^2}{Load}$$

Where:
PEV is the peak envelope voltage (volts),
Load is the load resistance (ohms).

Decibel calculations

One S-meter unit corresponds to a 6 dB change in signal strength.

The decibel is used as a measure of the ratio of two powers. It is a logarithmic unit and is used because the human ear has a logarithmic response. For example a one decibel change in loudness of a signal can just be discerned. A ten-fold increase in signal strength is perceived as twice as loud and the following formula is used to obtain a power ratio in decibels:

dB = 10 x LOG (P2/P1)
Where P2/P1 is the ratio of the power increase.

If voltages are being compared then the following formula is used instead:
dB = 20 LOG (V2/V1)

Some common power ratios expressed in dB:

Ratio	dB
0.1	-10
1	0
2	3
4	6
10	10
100	20
1000	30

The formula shows that one S-meter unit of 6 dB corresponds to a fourfold change in signal strength.

Impedance and reactance.

Impedance is measured in Ohms and is the opposition to electrical flow in a circuit containing resistance and reactance.

$$z = \sqrt{R^2 + X^2}$$

Where:
z is the impedance in ohms,
R is the resistance in ohms,
X is the reactance in ohms.

Reactance is the effect on electrical flow of a capacitor or inductor.

For a capacitor the reactance X (ohms) is given by:

$$X_c = \frac{1}{2\pi fC}$$

For an inductor the reactance X (ohms) is obtained from:

$$X_l = 2\pi fL$$

Where:

f is the frequency,
L and C are inductance and capacitance.

Transformers

To calculate the voltage changes through a transformer we use the turns ratio. The turns ratio is the ratio of turns of wire in the secondary windings compared to those in the primary windings.

Voltage ratio formula:

$$\frac{E2}{E1} = \frac{T2}{T1}$$

Where:
E2/E1 is the voltage ratio,
T2/T1 is the turns ratio.

Transformers are often used for impedance matching.

The impedance ratio (Z1/Z2) of a transformer is given by:

$$\frac{Z1}{Z2} = \left[\frac{T1}{T2}\right]^2$$

Or

$$\frac{T1}{T2} = \sqrt{\frac{Z1}{Z2}}$$

RMS voltage

In an AC circuit, the voltage is continuously varying between two extremes (peak voltage). To find the average power over a time interval we must make a correction for the fact that the voltage is not permanently at the peak value. This corrected voltage is called the RMS (root mean square) voltage. The RMS value of an AC voltage is the DC voltage that would produce the same amount of heat across a purely resistive load.

RMS value = (Peak value) x 0.707

(This equation assumes that the AC voltage is a sine wave)

The peak value represents the maximum excursions from zero. It is half the peak to peak value as observed on an oscilloscope.

Antenna calculations.

Cubical quad driven element: Length of each side = (1005/f) / 4 ft.
Cubical quad reflector: Length of each side = (1030/f) / 4 ft.

Delta loop driven element: Length of each side = (1005/f) / 3 ft.
Delta loop reflector: Length of each side = (1030/f) / 3 ft.

Yagi driven element Length = 472 / f ft.
Yagi director Length = 458 / f ft.
Yagi reflector Length = 490 / f ft.

In the above formulae the frequency f is in MHz.

Characteristic impedance and standing wave ratio.

For maximum power transfer the characteristic impedances of the transmitter output, feedline and antenna must all be equal. This condition is known as a perfect match and the standing wave ratio (SWR) is 1:1.

SWR = Z1/Z2

Where Z1 is the larger impedance and Z2 is the smaller.

Characteristic impedance of air insulated parallel conductor feedline

$$= 276 Log \frac{b}{a}$$

Where:
b is distance between conductor centers.
a is conductor radius

For an air insulated coaxial line the characteristic impedance is given by:

$$138 Log \frac{b}{a}$$

Resonance

Resonant frequency (theoretical version):

$$f = \frac{1}{2\pi\sqrt{LC}}$$

Where:

L is inductance in Henrys,
C is capacitance in Farads,
f is the resonant frequency in Hertz.

Resonant frequency (practical version):

$$f = \frac{10^6}{2\pi\sqrt{LC}}$$

Where:

L is inductance in microhenrys,
C is capacitance in picofarads,
f is the resonant frequency in kHz.

To obtain a value for C at resonance:

$$C = \frac{10^{12}}{4\pi^2 f^2 L}$$

To obtain a value for L at resonance:

$$L = \frac{10^{12}}{4\pi^2 f^2 C}$$

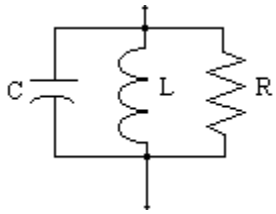
Half power bandwidth.

Half power bandwidth B:

$B = f/Q$

Where:
f is the resonant frequency,
Q is the quality or goodness of the resonant circuit.

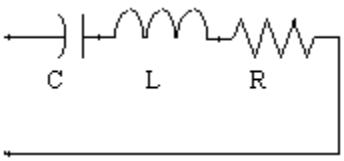
Q factor for a Parallel resonant circuit:



Q = R/X

Where:
X is the reactance of the inductor or capacitor. (They are equal at resonance.)
R is the effective resistance in parallel with the circuit.

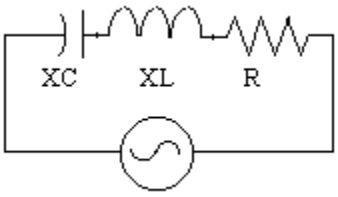
Q Factor for a series Resonant circuit



Q = X/R

Where:
X is the reactance of the inductor or capacitor. (They are equal at resonance.)
R is the effective resistance in series with the circuit.

Phase angle in a RLC circuit.



$$Tan\Phi = \frac{XL - XC}{R}$$

Where: Φ is the phase angle in degrees.
XL is the inductive reactance.
XC is the capacitive reactance.
Note:
If XL-XC is positive then the voltage leads the current.
If XL-XC is negative then the voltage lags the current.

Power factor

If we measure the true power (as heat) from a reactive circuit it is found to be less that the power calculated from voltage multiplied by current. This is due to the phase angle between the voltage and current. The ratio of true power to apparent power is called the power factor PF.

PF = Cosine (phase angle) = (True power) / (Apparent power)

Amplifier efficiency

Efficiency of RF power amplifiers:

Efficiency = (RF power out)/(DC power in) x 100.

For optimum efficiency in a vacuum tube amplifier:

R = V / (KI)

Where:
R is the load resistance in ohms.
V is the plate voltage in volts.
I is the plate current in amps.

K is a constant:
2 for a class C amplifier.
1.57 for a class B amplifier.
1.5 for a class AB amplifier.
1.3 for a class A amplifier.

For optimum efficiency in a transistor amplifier:

$$R = \frac{V^2}{2P}$$

Where:
V is the collector voltage in volts.
R is the load resistance in Ohms
P is the power output in watts.

Velocity factor

When constructing filters and impedance matching sections from transmission line, the slowing down of RF energy in the line needs to be taken into account. In parallel antenna feedline the energy typically travels at 80% of its speed in free space; the velocity factor is 0.8. The velocity factor for coaxial cable is around 0.7 and for twin lead it is 0.8. For a quarter wave line the length in feet would be:

L= (984 x velocity factor x wavelengths) / frequency

Where wavelengths in this case would be '0.25' for a quarter wave.

Frequency modulation and deviation.

Deviation ratio = [carrier maximum deviation (kHz)] / [Highest modulating frequency (kHz)]

Modulation index = (Deviation of carrier) / (Modulating frequency)

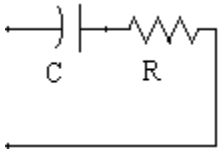
Time constant

Time constant is defined as the time in a RC circuit for the capacitor to charge to 63.2% of its maximum voltage.

(Or the time in a RL circuit for the current to reach 63.2% of its final value.)

For a RC circuit: $T = RC$

Impedance of an RC series circuit.



T = RC

Where C is the capacitance in Farads and R is the resistance in Ohms.
T is the time constant in seconds.

The impedance Z (ohms) of the above circuit is given by:

$$Z = \sqrt{R^2 + X^2}$$

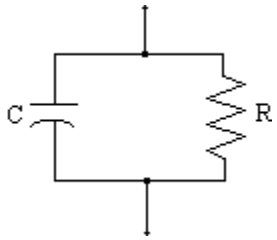
Where X is the capacitive reactance in ohms. The same formula can be used for a RL circuit, one containing resistance and inductance.

The phase angle of the above circuit is given by:

$$\tan \theta = \frac{R}{X}$$

For a capacitive reactance the angle θ will be negative and for an inductive reactance it will be positive.

Impedance of an RC parallel circuit.



$$Z = \frac{RX}{\sqrt{R + X^2}}$$

Where:
Z is the impedance in ohms.
X is the capacitive reactance in ohms.
R is the effective parallel resistance in ohms.
The same formula can be used for a RL circuit, one containing resistance and inductance.

The phase angle of the above circuit is given by:

$$\tan \theta = \frac{R}{X}$$

For a capacitive reactance the angle θ will be negative and for an inductive reactance it will be positive.

Polar and rectangular notation.

Polar to rectangular conversion

$$Z\angle\theta = Z\cos\theta + jZ\sin\theta$$

Where
Z is the impedance in ohms

is the phase angle in degrees.
J is a vector operator signifying 90 degree phase shift.

Rectangular to polar conversion:

For a series circuit:

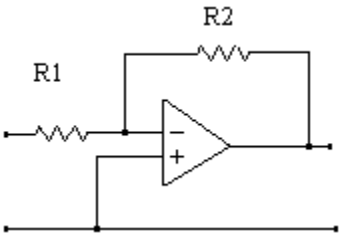
$$R + jX = \sqrt{R^2 + X^2}\angle\tan\left(\frac{X}{R}\right)$$

For a parallel circuit:

$$R + jX = \frac{RX}{\sqrt{R^2 + X^2}}\angle\tan\left(\frac{R}{X}\right)$$

Where X is the reactance in ohms.

Gain of an op-amp.



Gain = (R1+R2)/R1

Noise Power

P = KTB

Where:
P is the noise power in watts.
T is the absolute temperature. Room temperature is about 290K
K is Boltzmanns constant, equal to 1.38 x 10e-23
B is the bandwidth.

Bandwidth and baud rates

T = 1/B where T is the duration of 1 bit and B is the bandwidth in Baud.

For a Baudot transmission:
bandwidth = Baud rate + (1.2 x frequency shift) Hz

For a Morse code transmission:
bandwidth = (4 x WPM) Hz
Where WPM means words per minute.

Gain and beamwidth for a parabolic antenna.

The gain of a parabolic dish antenna is:

$$G = k\left(\frac{\pi D}{\lambda}\right)^2$$

Where:
G is power gain compared to an isotropic antenna.
k is an efficiency factor.
D is dish diameter in feet.
λ is wavelength in feet.

Beamwidth of a symmetrical pattern antenna:

$$B = \frac{203}{\sqrt{10^{\frac{G}{10}}}}$$

Where:
B is beamwidth in degrees.
G is antenna gain in dB

US Amateur Bands. (All frequencies are in MHz.)

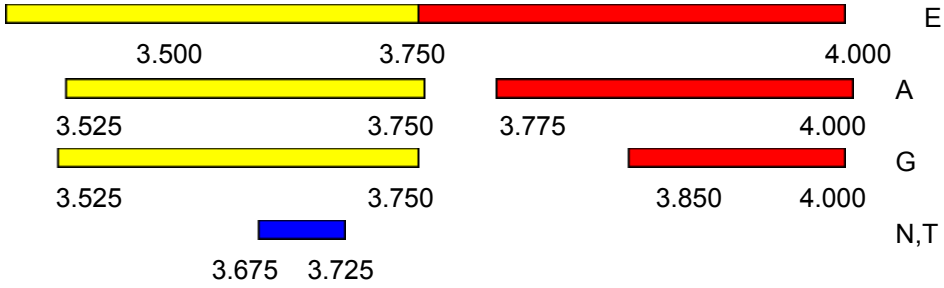
Key (Click on any colored bar for more details.)

E	Amateur Extra	A	Advanced
G	General	T	Technician
N	Novice		

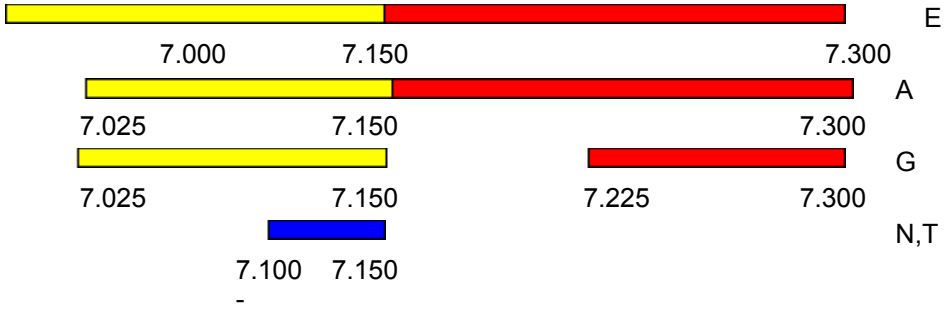
Unless otherwise stated, the maximum permitted power level on all bands is 1500 watts PEP output. This help topic is a summary, for full information see sections [97.301] and [97.305] of the FCC Part 97 rules.

160 Meters

80 Meters

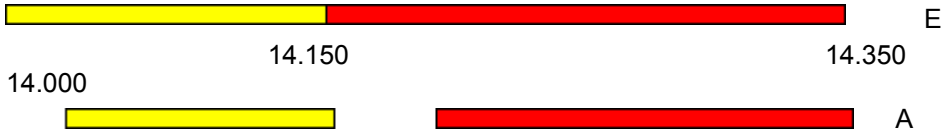


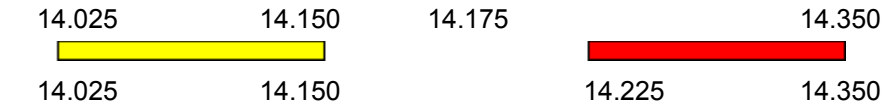
40 Meters



30 Meters

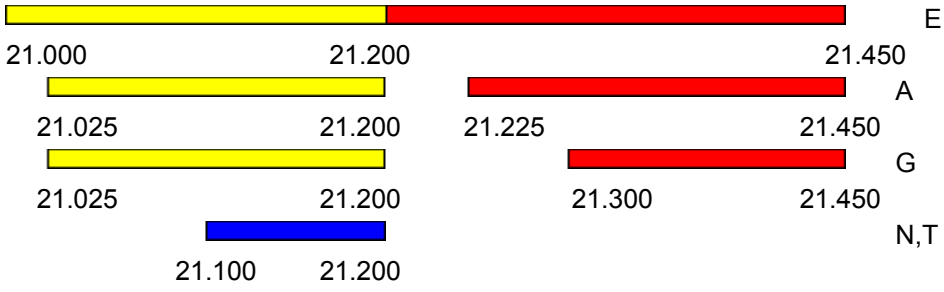
20 Meters





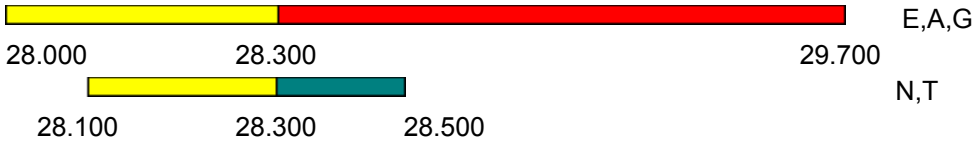
17 Meters

15 Meters



12 Meters

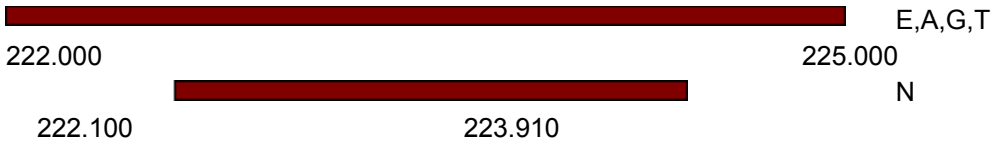
10 Meters



6 Meters

2 Meters

1.25 Meters

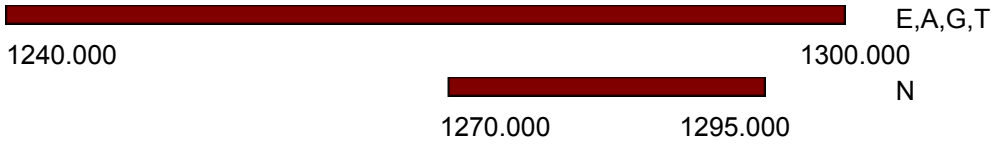


70 Centimeters

33 Centimeters

902.000 928.000

23 Centimeters



Further Amateur bands exist at:
13 cm, 9 cm, 5 cm, 3 cm, 1.2 cm, 6 mm, 4 mm, 2.5 mm, 2 mm, 1 mm.
On these bands the permitted emissions are CW, MCW, phone, image, RTTY, data, SS, test and pulse.
Extra, Advanced, General and Technician classes all have privileges throughout these bands.

Space operation

Certain frequencies and bands are available for space operation:

Available bands:
17m, 15m, 12m, 10m, 6mm, 4mm, 2mm, 1mm.

Available band segments:
7.0-7.1 MHz
14.00-14.25 MHz
144-146 MHz
435-438 MHz
1260-1270 MHz
2400-2450 MHz
3.40-3.41 GHz
5.83-5.85 GHz
10.45-10.50 GHz
24.00-24.05 GHz

Amateur Extra Class privileges:
CW, RTTY and data.

Amateur Extra Class privileges:
CW, phone, image

Advanced Class privileges:
CW, RTTY and data.

Advanced Class privileges:
CW, phone, image

General Class privileges:
CW, RTTY and data.

General Class privileges:
CW, phone, image

Extra, Advanced and General Class privileges:
CW, RTTY and data.

Extra Advanced and General Class privileges:
CW, phone, image

Novice and Technician Plus Class privileges:
CW, RTTY and data.
200 watts PEP maximum power.

Novice and Technician Plus Class privileges:
CW and SSB.
200 watts PEP maximum power.

Novice and Technician Plus Class privileges:
CW only

Extra Advanced and General Class privileges:

1.900-2.000 MHz are available on a secondary basis. Amateur transmissions must not cause harmful interference to other services and have no protection from other operations.

Extra, Advanced and General Class privileges:

CW, RTTY and data.

Maximum power output on 30 meters is 200 Watts PEP. Amateur transmissions must not cause interference to fixed services outside the US.

Extra, Advanced, General and Technician Class privileges:
CW, RTTY, data, MCW, test, phone and image.

Novice Class privileges:
CW, RTTY, data, MCW, test, phone and image.
Maximum power output is 25 watts PEP.

Extra, Advanced, General and Technician Class privileges:
CW only.

Novice Class privileges:
CW, RTTY, data, MCW, test, phone and image.
Maximum power output is 5 watts PEP.

Extra, Advanced, General and Technician Class privileges:

CW, RTTY, data, MCW, test, phone and image.

Some geographical and power restrictions apply. See FCC Part 97 section [97.301] paragraphs (f) and (g).

Purchasing via E-mail

Registration is just a few keystrokes away if you subscribe to CompuServe:

GO SWREG.

Locate the entry for NuTest using the Registration ID for the License Classes that you wish to study. When the registration details appear answer 'y' to register your copy of NuTest. The fee will automatically be debited from your CIS account.

For your convenience, I have set up a series of SWREG registration ID numbers. Choose the license classes you wish to study from the table below and use the corresponding SWREG ID:

License Classes required	SWREG ID	Total fee (US dollars)
Technician	**10446**	**14.95**
General	**10447**	**14.95**
Advanced	**10448**	**14.95**
Extra	**10449**	**14.95**
Technician and General	**10450**	**21.95**
General and Advanced	**10451**	**21.95**
Advanced and Extra	**10452**	**21.95**
All four license classes	**10453**	**29.95**
All four license classes plus NuMorse	**10676**	**45.00**

When I receive notification of your registration, I will send a software key to allow access to your chosen license classes. If you wish to study a particular combination that does not appear in this table then simply E-Mail me with your requirements before you register.

Are you already a registered NuMorse user? Then here is some good news!

Purchasing by credit card

If you have a valid Visa or MasterCard then contact *NorthStar Solutions* via any of the following methods:

Voice 1-800-699-6395 (10:00 a.m.-10:00 p.m., Eastern Standard Time. Toll free U.S. only)
Voice 1-803-699-6395 (10:00 a.m.-10:00 p.m., Eastern Standard Time.)

FAX 1-803-699-5465 (Available 24 hours, international and business orders welcome.)

CIS E-Mail 71561,2751 Internet 71561.2751@compuserve.com

Please have the following information ready when you call:
The program and version number (NuTest version 1.0)
Your mailing address. (And your Email address if you have one.)
Your Visa or Mastercard number and expiry date.
A list of License Classes that you wish to study. Here are the prices:

Number of classes	**Fee**
1	**$14.95**
2	**$21.95**
3	**$29.95**

(**Note** If 3 classes are purchased then the fourth one is included **FREE!**)

Special price for NuTest (Three Classes) and NuMorse **purchased together:**
$45.00

Are you already a registered NuMorse user? Then here is some good news!

You must tell *NorthStar Solutions* what license classes you require when you place your order.

Important note: *NorthStar Solutions* processes registrations only. Please contact the Author for product/technical support.

Registration by Post

You may register your copy of NuTest by mailing a registration fee in dollars or Pounds Starling to the address shown below. Acceptable methods of payment are Postal Order, cash or Check (payable to A. Lacy). If you wish you can print out a Registration form to include with your payment. Checks drawn on Non-U.K. banks are perfectly acceptable. Just write your check in the usual way, send it to me and I'll do the rest. I will send your software key to unlock the license classes you require by return post, but your check may require up to four weeks to clear your bank.

Here are the prices:

Number of classes	**Fee**
1	**$14.95**
2	**$21.95**
3	**$29.95**

(**Note:** If 3 classes are purchased then the fourth one is included **FREE!**)

Special price for NuTest (Three Classes) and NuMorse **purchased together: $45.00**

Are you already a registered NuMorse user? Then here is some good news!

Please send payment and your list of required license classes to:

A. Lacy,
58 Bilbrook Road,
Codsall,
Wolverhampton,
WV8 1ER,
United Kingdom.

Please note that airmail takes approximately 5 working days between the US and the UK.

Registration of NuTest

NuTest is not free software. This copy has been entrusted to you so that you can decide if it suits your needs. If you find it useful then you must purchase the right to use it. There are several ways to do this as detailed below.

The unregistered version of NuTest is converted to the registered version by means of a software key which I dispatch on the same day that payment is received. You choose what license classes you wish to study and I will send a software key that unlocks those classes. When you receive the key enter the details in the Registration page and click on the Done button.

Advantages of registering NuTest:

- I will provide support by E-Mail (or by Post if you prefer).
- I will be more likely to continue enhancing and developing NuTest.
- The registration fee request will not appear in the registered version.
- You will feel better.
- Registered users have access to License Classes right up to Extra Level.
- If you register NuTest for all license classes then you may register NuMorse for half the usual price

Please select your preferred method of payment:

Credit card

E-Mail

Post

NuTest Registration form

This form is provided for your convenience if registering by post. You can print it out by selecting File\ Print Topic.

License classes required (Please check **one** item only):

One (1) Class: $14.95 ___

Two (2) Classes $21.95 ___

Three (3) Classes $29.95 ___
(**Note:** If three (3) classes are purchased, then the fourth one is included FREE!)

Special price for NuTest (Three Classes) and NuMorse **purchased together:**
$45.00 ___

Please indicate which license classes you require (please tick **each** class required):

Technician ___ General ___ Advanced ___ Extra

Please ensure that you have included the correct fee for the number of license classes required.

Name : _____ **Date :** _____

Company : _____

Address : _____

City, State, Zip Code: _____

Country : _____

Daytime Phone : _____ **Evening :** _____

Electronic Mail address : _____

How did you hear about NuTest? : _____

Any comments : _____

Support for NuTest

My support policy for registered users:

I will answer questions on program usage by email or post and attempt to fix any serious bugs that are reported. If a serious bug turns out to be due to a specific feature of your system and I cannot offer a software fix then I will offer you a refund of your purchase price. This support will continue to be provided for a period of AT LEAST three months from the date of registration.

Support addresses:

CompuServe email:	100030,157
Internet:	100030.157@compuserve.com
Web site	http://ourworld.compuserve.com/homepages/Tony_Lacy

Postal address:
A. Lacy,
58 Bilbrook Road,
Codsall,
Wolverhampton,
WV8 1ER,
United Kingdom.

ASP OMBUDSMAN STATEMENT

This program is produced by a member of the Association of Shareware Professionals (ASP). ASP wants to make sure that the shareware principle works for you. If you are unable to resolve a shareware-related problem with an ASP member by contacting the member directly, ASP may be able to help. The ASP Ombudsman can help you resolve a dispute or problem with an ASP member, but does not provide technical support for members' products. Please write to the ASP Ombudsman at 545 Grover Road, Muskegon, MI USA 49442-9427, Fax 616-788-2765, or send a CompuServe message via CompuServe Mail to ASP Ombudsman 70007,3536.

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NuMorse for Windows

NuMorse is a companion program to NuTest. It generates accurately timed Morse code in the Windows operating environment. If you purchase NuMorse at the same time that you purchase NuTest (All license classes) then you need only pay **HALF PRICE** for NuMorse!

The price for NuTest (All license classes) and NuMorse purchased together is **$45.00**.

Are you already a registered NuMorse user? Then here is some good news!

If you do not already have NuMorse then it is available for download from:

ftp://ftp.asp-shareware.org/pub/asp/programs/homehobb/numors.zip

On CompuServe NuMorse can be found in the HAMNET forum, CW library section.

Here are a few of the many features of NuMorse:

Full support for Sound Blaster (TM) and 100% compatible sound cards; mixing speech and code!

Alter timing to send code as slowly as you like, then speed up as you become more proficient. Start with just a few characters, then add extra characters whenever you wish using filter feature.

Play characters from random stream, disk file, QSO generator or keyboard using character source feature.

Use Farnsworth timing options to alter code style from standard Morse or to enhance code clarity.

Morse speed, characters sent, and style can all be saved to file and then reloaded.

Full prosign support.

Several drill modes are included. You can guess the character sent. Configure how NuMorse responds to your guesses.

NuMorse will gather detailed statistics on your performance while training. The user can then utilize the statistics to automatically adjust code settings.

Adaptive mode where NuMorse adapts code speed to your abilities.

A large number of code filter options. The user may apply random number weighting so that certain characters are sent more often than others.

Send code output to a hardware device such as a tone generator.

Control speed and display your own messages during a Morse practice session using embedded control codes in a code source file.

A visual semaphore option.

Registered users of NuMorse may purchase **all four** license classes for the cost of two classes!
That's right…all four Classes for only $21.95!
To take advantage of this offer you must contact the author **before** ordering.